



## **INTERNATIONAL TECHNOLOGY & ENGINEERING EDUCATORS ASSOCIATION**

### **Engineering Technology Education Program of Study – Engineering by Design, ITEEA**

#### **9<sup>th</sup> Grade TE-1905 Fundamentals of Engineering Technology**

Fundamentals of Technology is a prerequisite course for most of the Technology Education systems. Communication skills and tools are the major focus of this course. These same skills are central to all subsequent technology courses. The computer and other electronic devices are necessary for teaching an understanding of contemporary communications, manufacturing, power/energy/transportation and construction systems. An engineering focus of problem solving requires students to define a given problem, conduct appropriate research, develop solutions to the problem, construct prototypes, and evaluate their work. This course is designed to introduce students to those principles and skills used in subsequent technology courses. Students learn to sketch solutions to problems, create technical drawings and presentations, build models, and apply creative problem solving methods. Emphasis is placed on accessing and communicating information, using simple and complex tools in a safe manner, and increasing the students' awareness of the historical and contemporary implications of technology. Students are introduced to computer-aided graphics, design software, and computer-aided manufacturing. Students develop an understanding of the tools, techniques, and processes of technology using design principles, computers, problem solving and model making.



#### **10<sup>th</sup> Grade Technological Design**

Prerequisite – Fundamentals of Engineering Technology

##### **Course Overview**

In Engineering Design, engineering scope, content, and professional practices are presented through practical applications. Students in engineering teams apply technology, science, and mathematics concepts and skills to solve engineering design problems and innovate designs. Students research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors, and ethics. This course is the capstone experience for students who are interested in technology, innovation, design and engineering.

Course Length - 36 weeks

#### **11<sup>th</sup> Grade Advanced Design Applications**

Prerequisite – Technological Design

##### **Course Overview**

Advanced Design Applications consists of four units including Manufacturing, Energy and Power, Construction and Transportation. The Manufacturing unit examines the advances that maintain manufacturing efficiency, how human consumption affects manufacturing, how manufacturing affects the standard of living of various peoples, and how processing and changing raw materials can produce more desirable products. The Construction unit examines a number of the factors influencing the design and construction of permanent and semi-permanent structures, the practices related to construction maintenance, alteration, and renovation, and the functions of the primary systems installed in those structures. The Energy & Power unit explores the relationship between energy and power technologies and all other technologies, and how modern energy and power systems impact cultures, societies, and the environment. It also offers an examination of how energy and power systems can be made more efficient and how they may be utilized in problem solving. The Transportation unit examines the complex networks of interconnected subsystems that each transportation system comprises and the roles of these components in the overall functional process of the system. It also analyzes of the improvements and the impacts of transportation technologies on the environment, society, and culture.

Course Length - 36 weeks

#### **12<sup>th</sup> Grade Engineering Design**

Prerequisite – Advanced Design Applications, as well as Algebra II, & Physics

##### **Course Overview**

Engineering Design will offer students the opportunity to understand and apply knowledge and skills required to create and transform ideas and concepts into a product that satisfies specific customer requirements. Students will experience design engineering in the creation, synthesis, iteration, and presentation of design solutions. Students will coordinate and interact in authentic ways to produce the form, fit, and function documentation with appropriate models to completely define a product. This course will maintain a focus on how engineers apply their creativity, resourcefulness,

mathematical, scientific, and technical knowledge and skills in the creation or refinement of technological products/systems. A key approach will be the employment of a sophisticated, sequential, and iterative design and development process to solve authentic engineering tasks/problems. Students will be challenged to participate as members of engineering teams within a typical business organization. Independent and group work will be reflective of authentic engineering projects found in the designed world. Student performance within this structure will be assessed in numerous and diverse ways. It is important to note that measurement of student performance will be reflective of actual professional engineering evaluative processes currently used in this career field. Both independent and collaborative work will be carefully analyzed as students perform within an authentic engineering enterprise environment.

The following major 'topics' or 'chapters' will be included to organize instruction of appropriate standards and benchmarks and reflect contemporary engineering industry practices:

- Principles of Design
- Engineering Resources
- Engineering Design Process
- Project Management

Course Length - 36 weeks